

Complete Summary

GUIDELINE TITLE

ACC/AHA/ESC guidelines for the management of patients with supraventricular arrhythmias. A report of the American College of Cardiology/American Heart Association Task Force and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients with Supraventricular Arrhythmias).

BIBLIOGRAPHIC SOURCE(S)

Blomstrom-Lundqvist C, Scheinman MM, Aliot EM, Alpert JS, Calkins H, Camm AJ, Campbell WB, Haines DE, Kuck KH, Lerman BB, Miller DD, Shaeffer CW, Stevenson WG, Tomaselli GF. ACC/AHA/ESC guidelines for the management of patients with supraventricular arrhythmias. A report of the American College of Cardiology/American Heart Association Task Force and the European Society of Cardiology Committee for Practice Guidelines. Bethesda (MD): American College of Cardiology Foundation; 2003. 62 p. [537 references]

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

SCOPE
 METHODOLOGY - including Rating Scheme and Cost Analysis
 RECOMMENDATIONS
 EVIDENCE SUPPORTING THE RECOMMENDATIONS
 BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS
 CONTRAINDICATIONS
 QUALIFYING STATEMENTS
 IMPLEMENTATION OF THE GUIDELINE
 INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT
 CATEGORIES
 IDENTIFYING INFORMATION AND AVAILABILITY
 DISCLAIMER

SCOPE

DISEASE/CONDITION(S)

Supraventricular arrhythmias

GUIDELINE CATEGORY

Assessment of Therapeutic Effectiveness
Diagnosis
Evaluation
Management
Treatment

CLINICAL SPECIALTY

Cardiology
Family Practice
Internal Medicine
Obstetrics and Gynecology

INTENDED USERS

Physicians

GUIDELINE OBJECTIVE(S)

- To assist physicians in clinical decision making by describing a range of generally acceptable approaches for the diagnosis and management of supraventricular arrhythmias.
- To provide clinicians with practical and authoritative guidelines for the management and treatment of patients with supraventricular arrhythmias by providing recommendations for diagnostic procedures as well as indications for antiarrhythmic drugs and/or nonpharmacologic treatments.

TARGET POPULATION

Patients with supraventricular arrhythmias including rhythms emanating from the sinus node, from atrial tissue (atrial flutter), and from junctional as well as reciprocating or accessory pathway-mediated tachycardia

Note: Patients with atrial fibrillation and pediatric patients are not covered. Postural orthostatic tachycardia syndrome is not included because it is not a disorder of the sinus node.

INTERVENTIONS AND PRACTICES CONSIDERED

Evaluation

1. Clinical history
2. Physical examination

Diagnosis

1. 12-lead electrocardiogram (ECG)
2. Echocardiographic examination
3. 24-hour Holter
4. Exercise testing
5. Transesophageal atrial recording and stimulation

Management

1. Patient education
 - Elimination of precipitating factors such as caffeine, alcohol, nicotine, recreational drugs, or hyperthyroidism
 - Vagal maneuvers
2. Pharmacologic treatment
 - Adenosine
 - Digoxin
 - Beta-blocking agents (e.g., metoprolol)
 - Nondihydropyridine calcium-channel antagonists (e.g., diltiazem, verapamil)
 - Class Ic drugs (e.g., flecainide, propafenone)
 - Class III drugs (e.g., sotalol, amiodarone, dofetilide)
 - Class Ia drugs (e.g., quinidine, procainamide, disopyramide)
3. Direct current (DC) cardioversion
4. Atrial overdrive pacing
5. Anticoagulant therapy
6. Closure of atrial septal defect
7. Catheter ablation
8. Referral to arrhythmia specialist

Note: Interventions for the treatment of postural orthostatic tachycardia syndrome (POTS) are considered in the original full text guideline but are not specifically recommended since POTS is not a disorder of the sinus node.

MAJOR OUTCOMES CONSIDERED

- Cardioversion to sinus rhythm
- Maintenance of sinus rhythm
- Recurrence of atrial fibrillation
- Heart rate control
- Death/mortality rate
- Adverse effects of treatment (e.g., hemorrhagic complications)
- Quality of life
- Cost effectiveness

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

The American College of Cardiology/American Heart Association/European Society of Cardiology (ACC/AHA/ESC) Writing Committee to Develop Guidelines for the Management of Patients With Supraventricular Tachycardias conducted a comprehensive review of the relevant literature. Literature searches were conducted in the following databases: PubMed/Medline, EMBASE, the Cochrane Library (including the Cochrane Database of Systematic Reviews and the

Cochrane Controlled Trials Registry), and Best Evidence. Searches were limited to English language sources and to human subjects. The references selected for this document are exclusively peer-reviewed papers that are representative but not all-inclusive.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

- A. (Highest) Derived from multiple randomized clinical trials
- B. (Intermediate) Data are based on a limited number of randomized trials, nonrandomized studies, or observational registries.
- C. (Lowest) Primary basis for the recommendation was expert consensus.

METHODS USED TO ANALYZE THE EVIDENCE

Review of Published Meta-Analyses
Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

The writing committee was composed of six members representing the American College of Cardiology Foundation (ACCF) and the American Heart Association (AHA), four members representing the European Society of Cardiology (ESC), and one member representing the North American Society for Pacing and Electrophysiology – Heart Rhythm Society (NASPE). The writing committee was chosen on the basis of willingness and availability to participate actively in meetings and the production of the final manuscript. Writing groups are specifically charged to perform a formal literature review, weigh the strength of evidence for or against a particular treatment or procedure, and estimate expected health outcomes where data exist. Patient-specific modifiers, comorbidities, and issues of patient preference that might influence the choice of particular tests or therapies are considered, as are frequency of follow-up and cost

effectiveness. In controversial areas, or with regard to issues without evidence other than usual clinical practice, a consensus was achieved by agreement of the expert panel after thorough deliberations.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective.

Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

Class IIa: Weight of evidence/opinion is in favor of usefulness/efficacy

Class IIb: Usefulness/efficacy is less well established by evidence or opinion

Class III: Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful.

COST ANALYSIS

A study compared the effect on quality of life between catheter ablation and pharmacologic therapy as an initial strategy for patients with supraventricular tachycardias (SVTs). Both treatments improved quality of life and decreased frequency of disease-specific symptoms, but ablation improved quality of life in more general health categories and resulted in complete amelioration of symptoms in more patients (74 vs. 33%) than did medication. Potential long-term costs were similar for medication and ablation. Among patients who had monthly episodes of supraventricular tachycardias, radiofrequency (RF) ablation was, however, the more effective and less expensive therapy compared with long-term drug therapy.

Another prospective study compared the long-term effects on health outcome of catheter ablation and medical therapy as an initial treatment for patients with newly documented paroxysmal supraventricular tachycardia (PSVT), excluding those with drug-refractory symptoms referred specifically for ablation. At 5-year follow-up, patients who received ablation had improved quality-of-life scores and a reduction in disease-specific symptoms when compared with patients who continued to take medical therapy. More patients reported complete elimination of symptoms with ablation therapy (70%) than did those taking medical therapy (43%). Over 5 years, the average cumulative cost for patients in the medical therapy group was statistically significantly lower than in patients initially treated with ablation therapy: \$6249 plus or minus \$1421 per patient versus \$7507 plus or minus \$1098 per patient. It was concluded that patient preference remains the critical determinant in choosing a particular treatment in cases of mildly to moderately symptomatic paroxysmal supraventricular tachycardia.

METHOD OF GUIDELINE VALIDATION

External Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

This document was peer reviewed by two official external reviewers representing the American College of Cardiology Foundation (ACCF), two official external reviewers representing the American Heart Association (AHA), and two official external reviewers representing the European Society of Cardiology (ESC). The North American Society for Pacing and Electrophysiology-Heart Rhythm Society assigned one organizational reviewer to the guideline. In addition, 37 external content reviewers participated in the review representing the ACC/AHA Task Force on Practice Guidelines, the ESC Committee for Practice Guidelines, the American College of Cardiology Foundation Electrophysiology Committee, the AHA Electrocardiogram (ECG)/Arrhythmias Committee, the ESC Working Group on Arrhythmias, and the ESC Task Force on Grown-Up Congenital Heart Disease.

This document was approved by the ACCF Board of Trustees in August 2003, by the AHA Science Advisory and Coordinating Committee in July 2003, and by the ESC Committee for Practice Guidelines in July 2003.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Definitions for the weight of the evidence (A-C) and classes of recommendations (I-III) can be found at the end of the "Major Recommendations" field.

Note: The order in which treatment recommendations appear in the following tables within each class of recommendation does not necessarily reflect a preferred sequence of administration. Please refer to the original guideline document for details. For pertinent drug dosing information, please refer to the National Guideline Clearinghouse summary [ACC/AHA/ESC Guidelines on the Management of Patients With Atrial Fibrillation](#).

Recommendations for Acute Management of Hemodynamically Stable and Regular Tachycardia

ECG	Recommendation ¹	Classification	Level of Evidence	References
Narrow QRS-complex tachycardia (SVT)	Vagal maneuvers	I	B	
	Adenosine	I	A	Glatter et al., 1999; Cairns & Niemann, 1991; Rankin et al., 1992
	Verapamil, diltiazem	I	A	Waxman et al., 1981
	Beta blockers	IIb	C	Amsterdam, Kulcyski & Ridgeway,

ECG	Recommendation ¹	Classification	Level of Evidence	References
				1991; Das et al., 1988
	Amiodarone	IIb	C	Holt et al., 1985
	Digoxin	IIb	C	
Wide QRS-complex tachycardia				
• SVT + BBB	See above			
• Pre-excited SVT/AF ²	Flecainide ³	I	B	Hohnloser & Zabel, 1992
	Ibutilide ³	I	B	Glatter, Dorostkar & Yang, 2001
	Procainamide ³	I	B	
	DC cardioversion	I	C	
• Wide QRS-complex tachycardia of unknown origin	Procainamide ³	I	B	Gorgels et al., 1996; Manz et al., 1992
	Sotalol ³	I	B	Ho et al., 1994
	Amiodarone	I	B	Boineau et al., 1980; Scheinman et al., 1995
	DC cardioversion	I	B	Part 1: Introduction to the International Guidelines 2000 for CPR and ECC, 2000
	Lidocaine	IIb	B	Manz et al., 1992; Ho et al., 1994
	Adenosine ⁴	IIb	C	Sharma, Klein & Yee, 1990
	Beta blockers ⁵	III	C	Part 1: Introduction to the International Guidelines

ECG	Recommendation ¹	Classification	Level of Evidence	References
	Verapamil ⁶	III	B	2000 for CPR and ECC, 2000 Buxton et al., 1987
Wide QRS-complex tachycardia of unknown origin in patients with poor LV function	Amiodarone	I	B	Boineau et al., 1980; Scheinman et al., 1995
	DC cardioversion, lidocaine	I	B	Part 1: Introduction to the International Guidelines 2000 for CPR and ECC, 2000

¹All listed drugs are administered intravenously.

²See Section V-D.

³Should not be taken by patients with reduced LV function.

⁴Adenosine should be used with caution in patients with severe coronary artery disease because vasodilation of normal coronary vessels may produce ischemia in vulnerable territory. It should be used only with full resuscitative equipment available.

⁵Beta blockers may be used as first-line therapy for those with catecholamine-sensitive tachycardias, such as right ventricular outflow tachycardia.

⁶Verapamil may be used as first-line therapy for those with LV fascicular VT.

Abbreviations: AF, atrial fibrillation; BBB, bundle-branch block; DC, direct current; ECG, electrocardiogram; LV, left ventricular; QRS, ventricular activation on ECG; SVT, supraventricular tachycardia; VT, ventricular tachycardia

Recommendations for Treatment of Inappropriate Sinus Tachycardia

Treatment	Recommendation	Classification	Level of Evidence	References
Medical	Beta blockers	I	C	
	Verapamil, diltiazem	IIa	C	
Interventional	Catheter ablation—sinus node	IIb	C	Sato et al., 2000;

Treatment	Recommendation	Classification	Level of Evidence	References
	modification/elimination*			Mischke, Stellbrink & Hanrath, 2001; Man et al., 2000; Lee et al., 1995; Yee et al., 1984; Esmailzadeh et al., 1997; de Paola et al., 1992; Jayaprakash, Sparks & Vohra, 1997

*Used as a last resort.

Recommendations for Long-Term Treatment of Patients With Recurrent AVNRT

Clinical Presentation	Recommendation	Classification	Level of Evidence	References
Poorly tolerated AVNRT with hemodynamic intolerance	Catheter ablation	I	B	Akhtar et al., 1993
	Verapamil, diltiazem, beta blockers, sotalol, amiodarone	IIa	C	Akhtar et al., 1993
	Flecainide, ¹ propafenone ¹	IIa	C	
Recurrent symptomatic AVNRT	Catheter ablation	I	B	Akhtar et al., 1993
	Verapamil	I	B	Mauritson et al., 1982
	Diltiazem, beta blockers	I	C	Winniford, Fulton & Hillis, 1984
	Digoxin ²	IIb	C	
Recurrent AVNRT unresponsive to beta blockade or calcium-channel blocker and patient not desiring RF ablation	Flecainide ¹ propafenone, ¹ sotalol	IIa	B	Tendera et al., 2001; Anderson et al., 1994; Pritchett, McCarthy & Wilkinson,

Clinical Presentation	Recommendation	Classification	Level of Evidence	References
	Amiodarone	IIb	C	1991; Wanless et al., 1997; Henthorn et al., 1991; "A randomized, placebo-controlled trial," 1995
AVNRT with infrequent or single episode in patients who desire complete control of arrhythmia	Catheter ablation	I	B	Gambhir et al., 1996
Documented PSVT with only dual AV-nodal pathways or single echo beats demonstrated during electrophysiological study and no other identified cause of arrhythmia	Verapamil, diltiazem, beta blockers, flecainide ¹ , propafenone ¹	I	C	
	Catheter ablation ³	I	B	
Infrequent, well-tolerated AVNRT	No therapy	I	C	Akhtar et al., 1993
	Vagal maneuvers	I	B	
	Pill-in-the-pocket	I	B	
	Verapamil, diltiazem, beta blockers	I	B	
	Catheter ablation	I	B	Bogun et al., 1996

¹Relatively contraindicated for patients with coronary artery disease, LV dysfunction, or other significant heart disease.

²Digoxin is often ineffective because pharmacological effects can be overridden by enhanced sympathetic tone.

³Decision depends on symptoms.

Abbreviations: AV, atrioventricular; AVNRT, atrioventricular nodal reciprocating tachycardia; LV, left ventricular; PSVT, paroxysmal supraventricular tachycardia; RF, radiofrequency

Recommendations for Treatment of Focal and Nonparoxysmal Junctional Tachycardia Syndromes

Tachycardia	Recommendation	Classification	Level of Evidence	References
Focal junctional tachycardia	Beta blockers	IIa	C	
	Flecainide	IIa	C	Kuck et al., 1988
	Propafenone ¹	IIa	C	Paul et al., 1992
	Sotalol ¹	IIa	C	Maragnes, Fournier & Davignon, 1992
	Amiodarone ¹	IIa	C	Fidell et al., 1973; Villain et al., 1990
	Catheter ablation	IIa	C	Hamdan, Dorostkar, Scheinmann, 2000; Ehlert et al., 1993; Hamdan et al., 1996; Scheinman et al., 1994
Nonparoxysmal junctional tachycardia	Reverse digitalis toxicity	I	C	Castellanos, Sung & Myerburg, 1979; Storstein et al., 1977
	Correct hypokalemia	I	C	
	Treat myocardial ischemia	I	C	Fisch, 1970
	Beta blockers, calcium-channel blockers	IIa	C	Lee et al., 1999; Breslow, Evers & Lebowitz, 1985

¹Data available for pediatric patients only.

Recommendations for Long-Term Therapy of Accessory Pathway-Mediated Arrhythmias

Arrhythmia	Recommendation	Classification	Level of Evidence	References
WPW syndrome (pre-excitation and symptomatic arrhythmias), well tolerated	Catheter ablation	I	B	Scheinmann & Huang, 2000; Jackman et al., 1991; Manolis, Katsaros & Cokkinos, 1992; Zipes et al., 1995
	Flecainide, propafenone	IIa	C	Henthorn et al., 1991; Manolis, Katsaros & Cokkinos, 1992; Janousek et al., 1993; Musto et al., 1988; Vignati, Mauri & Figini, 1993; Vassiliadis et al., 1990; Helmy et al., 1990; Kim, Lal & Ruffy, 1986; Cockrell et al., 1991; Hoff et al., 1988; Wiseman et al., 1990; Benditt et al., 1991; Pritchett et al., 1991; Manolis & Estes, 1989
	Sotalol, amiodarone, beta blockers	IIa	C	Kunze, Schluter & Kuck, 1987; Mason, 1987; Rosenbaum

Arrhythmia	Recommendation	Classification	Level of Evidence	References
				et al., 1974; Wellens et al., 1976; Kappenberger et al., 1984
	Verapamil, diltiazem, digoxin	III	C	Lai et al., 1993
WPW syndrome (with AF and rapid-conduction or poorly tolerated AVRT)	Catheter ablation	I	B	Scheinman & Huang, 2000; Calkins et al., 1999; Jackman et al., 1991; Calkins et al., 1991; Kuck et al., 1991; Calkins et al., 1992; Lesh et al., 1993; Scheinmann, 1995; Hindricks, 1993
AVRT, poorly tolerated (no pre-excitation)	Catheter ablation	I	B	Scheinman & Huang, 2000; Calkins et al., 1999; Jackman et al., 1991; Calkins et al., 1991; Kuck et al., 1991; Calkins et al., 1992; Lesh et al., 1993; Scheinmann, 1995; Hindricks, 1993
	Flecainide, propafenone	IIa	C	Henthorn et al., 1991; Manolis, Katsaros & Cokkinos, 1992; Janousek et al., 1993; Musto et al.,

Arrhythmia	Recommendation	Classification	Level of Evidence	References
Single or infrequent AVRT episode(s) (no pre-excitation)				1988; Vignati, Mauri & Figini, 1993; Vassiliadis et al., 1990; Helmy et al., 1990; Kim, Lal & Ruffy, 1986; Cockrell et al., 1991; Hoff et al., 1988; Wiseman et al., 1990; Benditt et al., 1991; Pritchett et al., 1991; Manolis & Estes, 1989
	Sotalol, amiodarone	IIa	C	Kunze, Schluter & Kuck, 1987; Mason, 1987; Rosenbaum et al., 1974; Wellens et al., 1976; Kappenberger et al., 1984
	Beta blockers	IIb	C	Lai et al., 1993
	Verapamil, diltiazem, digoxin	III	C	Lai et al., 1993
	None	I	C	
	Vagal maneuvers	I	B	
	Pill-in-the-pocket—verapamil, diltiazem, beta blockers	I	B	Alboni et al., 2001; Yeh et al., 1985
	Catheter ablation	IIa	B	Scheinman & Huang, 2000; Calkins et al., 1999; Jackman et

Arrhythmia	Recommendation	Classification	Level of Evidence	References
				al., 1991; Calkins et al., 1991; Kuck et al., 1991; Calkins et al., 1992; Lesh et al., 1993; Scheinman, 1995; Hindricks, 1993
	Sotalol, amiodarone	IIb	B	Kunze, Schluter & Kuck, 1987; Mason, 1987; Rosenbaum et al., 1974; Wellens et al., 1976; Kappenberger et al., 1984
	Flecainide, propafenone	IIb	C	Henthorn et al., 1991; Manolis, Katsaros & Cokkinos, 1992; Janousek et al., 1993; Musto et al., 1988; Vignati, Mauri & Figini, 1993; Vassiliadis et al., 1990; Helmy et al., 1990; Kim, Lal & Ruffy, 1986; Cockrell et al., 1991; Hoff et al., 1988; Wiseman et al., 1990; Benditt et al., 1991; Pritchett et

Arrhythmia	Recommendation	Classification	Level of Evidence	References
				al., 1991; Manolis & Estes, 1989; Lai et al., 1993
	Digoxin	III	C	
Pre-excitation, asymptomatic	None	I	C	
	Catheter ablation	IIa	B	Scheinman & Huang, 2000; Calkins et al., 1999; Jackman et al., 1991; Calkins et al., 1991; Kuck et al., 1991; Calkins et al., 1992; Lesh et al., 1993; Scheinman, 1995; Hindricks, 1993

Abbreviations: AF, atrial fibrillation; AVRT, atrioventricular reciprocating tachycardia; WPW, Wolff-Parkinson-White

Recommendations for Treatment of Focal Atrial Tachycardias¹

Clinical Situation	Recommendation	Classification	Level of Evidence	References
Acute treatment ²				
A. Conversion				
Hemodynamically unstable patient	DC cardioversion	I	B	
Hemodynamically stable patient	Adenosine	IIa	C	Markowitz et al., 1999; Engelstein et al., 1994
	Beta blockers	IIa	C	Harrison et al., 2001; Stock, 1966
	Verapamil, diltiazem	IIa	C	Steinbeck & Hoffman, 1998;

Clinical Situation	Recommendation	Classification	Level of Evidence	References
				Kunze et al., 1986
	Procainamide	IIa	C	
	Flecainide/propafenone	IIa	C	Kunze et al., 1986; Berns et al., 1987; Coumel, Leclercq & Assayag, 1984; Lesh, Kalman & Olgin, 1996
	Amiodarone, sotalol	IIa	C	Wren, 1998; Coumel, Leclercq & Assayag, 1984; Beaufort-Krol & Bink-Boelkens, 1997; Carrasco et al., 1985; Kopelman & Horowitz, 1989; Prager et al., 1993
B. Rate regulation (in absence of digitalis therapy)	Beta blockers	I	C	Harrison et al., 2001; Stock, 1966
	Verapamil, diltiazem	I	C	Chen et al., 1994
	Digoxin	IIb	C	
Prophylactic therapy				
Recurrent symptomatic AT	Catheter ablation	I	B	Hsieh & Chen, 2002
	Beta blockers, calcium-channel blockers	I	C	
	Disopyramide ³	IIa	C	Carrasco et al., 1985
	Flecainide/propafenone ³	IIa	C	Kunze et al., 1986; Coumel,

Clinical Situation	Recommendation	Classification	Level of Evidence	References
	Sotalol, amiodarone	IIa	C	Leclercq & Assayag, 1984; Lesh, Kalman & Olgin, 1996; Creamer, Nathan & Camm, 1985; Pool & Quart, 1988 Wren, 1998; Beaufort-Krol & Bink-Boelkens, 1997; Carrasco et al., 1985; Kopelman & Horowitz, 1989
Asymptomatic or symptomatic incessant ATs	Catheter ablation	I	B	
Nonsustained and asymptomatic	No therapy	I	C	
	Catheter ablation	III	C	

¹Excluded are patients with MAT in whom beta blockers and sotalol are often contraindicated due to pulmonary disease.

²All listed drugs for acute treatment are taken intravenously.

³Flecainide, propafenone, and disopyramide should not be used unless they are combined with an AV-nodal—blocking agent.

Abbreviations: AT, atrial tachycardia; DC, direct current; MAT, multifocal atrial tachycardia

Recommendations for Acute Management of Atrial Flutter

Clinical Status/Proposed Therapy	Recommendation ¹	Classification	Level of Evidence	References
Poorly tolerated				

Clinical Status/Proposed Therapy	Recommendation ¹	Classification	Level of Evidence	References
<ul style="list-style-type: none"> Conversion 	DC cardioversion	I	C	
<ul style="list-style-type: none"> Rate control 	Beta blockers	IIa	C	
	Verapamil or diltiazem	IIa	C	
	Digitalis ²	IIb	C	
	Amiodarone	IIb	C	
Stable flutter				
<ul style="list-style-type: none"> Conversion 	Atrial or transesophageal pacing	I	A	Doni et al., 2000; Rostas, Antal & Putorek, 1999; Tucker & Wilson, 1993; Doni et al., 1995; Doni et al., 1996
	DC cardioversion	I	C	Lown, 1967
	Ibutilide ³	IIa	A	Stambler et al., 1996; Ellenbogen et al., 1996
	Flecainide ⁴	IIb	A	Suttorp et al., 1990; Kingma & Suttorp, 1992
	Propafenone ⁴	IIb	A	Suttorp et al., 1990; Kingma & Suttorp, 1992
	Sotalol	IIb	C	Vos et al., 1998; Sung et al., 1995
	Procainamide ⁴	IIb	A	Volgman et al., 1998
	Amiodarone	IIb	C	Hohnloser & Zabel, 1992; Hou et al., 1995

Clinical Status/Proposed Therapy	Recommendation ¹	Classification	Level of Evidence	References
• Rate control	Diltiazem or verapamil	I	A	Waxman et al., 1981; Schreck, Rivera & Tricarico, 1997; Platia et al., 1989; Goldenberg et al., 1994
	Beta blockers	I	C	Platia et al., 1989
	Digitalis ²	IIb	C	Schreck, Rivera & Tricarico, 1997
	Amiodarone	IIb	C	Hou et al., 1995

Cardioversion should be considered only if the patient is anticoagulated (INR equals 2 to 3), the arrhythmia is less than 48 hours in duration, or the TEE shows no atrial clots.

¹All drugs are administered intravenously.

²Digitalis may be especially useful for rate control in patients with heart failure.

³Ibutilide should not be used in patients with reduced LV function.

⁴Flecainide, propafenone, and procainamide should not be used unless they are combined with an AV-nodal-blocking agent.

Abbreviations: AV, atrioventricular; DC, direct current; INR, international normalized ratio; LV, left ventricular; TEE, transesophageal echocardiography

Recommendations for Long-Term Management of Atrial Flutter

Clinical Status/Proposed Therapy	Recommendation	Classification	Level of Evidence	References
First episode and well-tolerated atrial flutter	Cardioversion alone	I	B	Lown, 1967
	Catheter ablation ¹	IIa	B	Natale et al., 2000
Recurrent and well-tolerated atrial	Catheter ablation ¹	I	B	Willems et al., 2000;

Clinical Status/Proposed Therapy	Recommendation	Classification	Level of Evidence	References
flutter				Kottkamp et al., 2000; Chen et al., 1996
	Dofetilide	IIa	C	Singh et al., 2000; Pedersen et al., 2001
	Amiodarone, sotalol, flecainide, ² ³ quinidine, ² ³ propafenone, ² ³ procainamide, ² ³ disopyramide ² ³	IIb	C	Hohnloser & Zabel, 1992; Benditt et al., 1999; Naccarelli et al., 1996
Poorly tolerated atrial flutter	Catheter ablation ¹	I	B	Willems et al., 2000; Kottkamp et al., 2000; Chen et al., 1996
Atrial flutter appearing after use of class Ic agents or amiodarone for treatment of AF	Catheter ablation ¹	I	B	Reithmann et al., 2000; Huang et al., 1998
	Stop current drug and use another	IIa	C	
Symptomatic non—CTI-dependent flutter after failed antiarrhythmic drug therapy	Catheter ablation ¹	IIa	B	Akar et al., 2001; Chan et al., 2000; Delacretaz et al., 2001

¹Catheter ablation of the AV junction and insertion of a pacemaker should be considered if catheter ablative cure is not possible and the patient fails drug therapy.

²These drugs should not be taken by patients with significant structural cardiac disease. Use of anticoagulants is identical to that described for patients with AF.

³Flecainide, propafenone, procainamide, quinidine, and disopyramide should not be used unless they are combined with an AV-nodal-blocking agent.

Abbreviations: AF, atrial fibrillation; AV, atrioventricular; CTI, cavotricuspid isthmus

Recommendations for Treatment Strategies for SVT During Pregnancy

Treatment Strategy	Recommendation	Classification	Level of Evidence
Acute conversion of PSVT	Vagal maneuver	I	C
	Adenosine	I	C
	DC cardioversion	I	C
	Metoprolol, propranolol	IIa	C
	Verapamil	IIb	C
Prophylactic therapy	Digoxin	I	C
	Metoprolol ¹	I	B
	Propranolol ¹	IIa	B
	Sotalol, ¹ flecainide ²	IIa	C
	Quinidine, propafenone, ² verapamil	IIb	C
	Procainamide	IIb	B
	Catheter ablation	IIb	C
	Atenolol ³	III	B
	Amiodarone	III	C

¹Beta-blocking agents should not be taken in the first trimester, if possible.

²Consider AV-nodal—blocking agents in conjunction with flecainide and propafenone for certain tachycardias (see Section V).

³Atenolol is categorized in class C (drug classification for use during pregnancy) by legal authorities in some European countries.

Abbreviations: AV, atrioventricular; DC, direct current; PSVT, paroxysmal supraventricular tachycardia

Recommendations for Treatment of SVTs in Adults With Congenital Heart Disease

Condition	Recommendation	Classification	Level of Evidence	References
Failed antiarrhythmic drugs and symptomatic:				
• Repaired	Catheter ablation in an experienced	I	C	Nakagawa et al., 2001;

Condition	Recommendation	Classification	Level of Evidence	References
ASD	center			Triedman et al., 2001; Triedman et al., 1995; Delacretaz et al., 2001; Hebe et al., 2000; Triedman et al., 2002; Lesh et al., 1994; Triedman et al., 1997
<ul style="list-style-type: none"> Mustard or Senning repair of transposition of the great vessels 	Catheter ablation in an experienced center	I	C	Triedman et al., 1995; Delacretaz et al., 2001; Hebe et al., 2000; Triedman et al., 2002
Unrepaired asymptomatic ASD not hemodynamically significant	Closure of the ASD for treatment of the arrhythmia	III	C	Attie et al., 2001; Donti et al., 2001
Unrepaired hemodynamically significant ASD with atrial flutter*	Closure of the ASD combined with ablation of the flutter isthmus	I	C	
PSVT and Ebstein's anomaly with hemodynamic indications for surgical repair	Surgical ablation of accessory pathways at the time of operative repair of the malformation at an experienced center	I	C	Huang et al., 2000; Misaki et al., 1995

*Conversion and antiarrhythmic drug therapy initial management as described for atrial flutter (see Section V-F).

Abbreviations: ASD, atrial septal defect; PSVT, paroxysmal supraventricular tachycardia

Definitions:

Class I: Conditions for which there is evidence and/or general agreement that a given procedure or treatment is useful and effective.

Class II : Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.

Class IIa: Weight of evidence/opinion is in favor of usefulness/efficacy

Class IIb: Usefulness/efficacy is less well established by evidence or opinion

Class III : Conditions for which there is evidence and/or general agreement that the procedure/treatment is not useful or effective and in some cases may be harmful.

Weight of Evidence

- A. (Highest) Derived from multiple randomized clinical trials
- B. (Intermediate) Data are based on a limited number of randomized trials, nonrandomized studies, or observational registries.
- C. (Lowest) Primary basis for the recommendation was consensus.

CLINICAL ALGORITHM(S)

Algorithms are provided in the original guideline document for:

- Initial evaluation of patients with suspected tachycardia
- Differential diagnosis for narrow ventricular activation on electrocardiogram (QRS) tachycardia
- Response of narrow complex tachycardias to adenosine
- Differential diagnosis for wide QRS-complex tachycardia (greater than 120 ms)
- Acute management of patients with hemodynamically stable and regular tachycardia
- Management of atrial flutter depending on hemodynamic stability

EVIDENCE SUPPORTING THE RECOMMENDATIONS

REFERENCES SUPPORTING THE RECOMMENDATIONS

[References open in a new window](#)

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

Recommendations are evidence-based and derived primarily from published data. The weight of evidence is given for each recommendation (see the "Major Recommendations" field).

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

Effective management of patients with supraventricular arrhythmias with appropriate use of diagnostic procedures and treatment with pharmacologic and nonpharmacologic antiarrhythmic approaches

POTENTIAL HARMS

Antiarrhythmic Drug Therapy

- A major concern accompanying the use of antiarrhythmic drugs, particularly when treating an arrhythmia that is not life threatening, such as supraventricular tachycardia (SVT), is the occurrence of ventricular proarrhythmia (e.g., torsade de pointes). A number of clinical factors increase the risk of proarrhythmia, including age, gender, fluid and electrolyte abnormalities, the presence of underlying heart disease, abnormalities of drug clearance, polypharmacy, and drug-drug interactions. Drug-induced slowing of the rate of atrial flutter with the production of one-to-one conduction to the ventricle represents a potentially life-threatening form of proarrhythmia unique to the treatment of SVT.
- The potential benefit of class Ic agents should be balanced with the potential risks of proarrhythmia and toxicity. Because atrial tachycardia (ATs) commonly occur in older patients and in the context of structural heart disease, class Ic agents should be used only after coronary artery disease is excluded.
- Potential adverse effects of adenosine include initiation of atrial fibrillation (AF) (1 to 15%), which is usually transient, and may be particularly problematic for those with ventricular pre-excitation. Adenosine should be avoided in patients with severe bronchial asthma. It is important to use extreme care with concomitant use of intravenous (IV) calcium-channel blockers and beta blockers because of possible potentiation of hypotensive and/or bradycardic effects. Hypotension and sinus bradycardia are rare complications of diltiazem plus propranolol.
- Amiodarone is associated with organ toxicity and a high rate of discontinuation.

Intravenous (IV) Antiarrhythmia Drugs

- Intravenous verapamil or diltiazem may be deleterious because they may precipitate hemodynamic collapse for a patient with ventricular tachycardia (VT).
- In a study comparing IV flecainide with propafenone adverse effects included ventricular activation on electrocardiogram (ECG) (QRS) widening, dizziness, and paresthesias.
- In one study adverse effects of IV sotalol included hypotension and dyspnea.
- A review of the existing literature for IV antiarrhythmic drugs taken by patients with atrial flutter suggests that dofetilide or ibutilide are more effective than sotalol or class I agents but are associated with a significant incidence of torsades de pointes (1.5 to 3%).

Antiarrhythmic Drugs During Pregnancy

- Propranolol and metoprolol are generally considered to be safe but are best avoided in the first trimester of pregnancy. Rare cases of adverse effects on

the fetus, including bradycardia, hypoglycemia, premature labor, and metabolic abnormalities, have been reported but may be secondary to fetal distress in high-risk pregnancies. The potential for intrauterine growth retardation has been reported with propranolol and has raised concerns, especially when it is taken in the first trimester. Later studies reported growth retardation in babies receiving atenolol in the first trimester and a higher prevalence of preterm delivery.

- The use of amiodarone, a category D agent, in pregnancy should be restricted to arrhythmias that are resistant to other drugs or are life threatening.
- Quinidine is considered to be relatively well tolerated during pregnancy, although isolated cases of adverse effects, such as fetal thrombocytopenia and eighth-nerve toxicity, have been reported

Catheter Ablation

- Potential adverse effects include pericarditis, phrenic nerve injury, superior vena cava (SVC) syndrome, or need for permanent pacing.
- Complications associated with catheter ablation of accessory pathways result from radiation exposure, vascular access (e.g., hematomas, deep venous thrombosis, arterial perforation, arteriovenous fistula, pneumothorax), catheter manipulation (e.g., valvular damage, microemboli, perforation of the coronary sinus or myocardial wall, coronary artery dissection, thrombosis), or delivery of radiofrequency (RF) energy (e.g., AV block, myocardial perforation, coronary artery spasm or occlusion, transient ischemic attacks, cerebrovascular accidents). The procedure-related mortality reported for catheter ablation of accessory pathways ranges from 0 to 0.2%. The voluntary Multicentre European Radiofrequency Survey (MERFS) reported data from 2222 patients who underwent catheter ablation of an accessory pathway. The overall complication rate was 4.4%, including 3 deaths (0.13%). The 1995 NASPE survey of 5427 patients who underwent catheter ablation of an accessory pathway reported a total of 99 (1.82%) significant complications, including 4 procedure-related deaths (0.08%). Among the 500 patients who underwent catheter ablation of an accessory pathway as part of a prospective, multicenter clinical trial, there was 1 death (0.2%). This patient died of dissection of the left main coronary artery during an attempt at catheter ablation of a left free-wall accessory pathway. The most common major complications are complete AV block and cardiac tamponade. The incidence of inadvertent complete AV block ranges from 0.17 to 1.0%. Most occur in the setting of attempted ablation of septal accessory pathways located close to the AV junction. The frequency of cardiac tamponade varies between 0.13 and 1.1%.

Subgroups Most Likely to Experience Harms

- Patients with structural heart defects may not be candidates for catheter ablation.
- Ibutilide should not be used in patients with an ejection fraction of less than 30% due to increased risk of polymorphic ventricular tachycardia (VT). Intravenous ibutilide should not be taken by patients with severe structural cardiac diseases or prolonged QT interval, or in those with underlying sinus node disease.

- Patients with kidney or liver disease are at increased risk of drug toxicity, including proarrhythmia with antiarrhythmic drugs.

CONTRAINDICATIONS

CONTRAINDICATIONS

- Class Ic agents (i.e., flecainide and propafenone) are contraindicated for patients with structural heart disease.
- Flecainide and propafenone are relatively contraindicated for patients with coronary artery disease, left ventricular dysfunction, or other significant heart disease.
- Beta blockers and sotalol are often contraindicated in patients with multifocal atrial tachycardia (MAT) due to pulmonary disease.
- Contraindications for dofetilide include a creatinine clearance less than 20, hypokalemia, hypomagnesemia, and prolonged QT at baseline.

QUALIFYING STATEMENTS

QUALIFYING STATEMENTS

- These guidelines attempt to define practices that meet the needs of most patients in most circumstances. The ultimate judgment regarding care of a particular patient must be made by the physician and the patient in light of all of the circumstances presented by that patient. There are circumstances in which deviations from these guidelines are appropriate.
- The guideline is a consensus document that includes evidence and expert opinions from several countries. The pharmacologic and nonpharmacologic antiarrhythmic approaches discussed may, therefore, include some drugs and devices that do not have the approval of governmental regulatory agencies.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Clinical Algorithm
Personal Digital Assistant (PDA) Downloads
Pocket Guide/Reference Cards

For information about [availability](#), see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

Blomstrom-Lundqvist C, Scheinman MM, Aliot EM, Alpert JS, Calkins H, Camm AJ, Campbell WB, Haines DE, Kuck KH, Lerman BB, Miller DD, Shaeffer CW, Stevenson WG, Tomaselli GF. ACC/AHA/ESC guidelines for the management of patients with supraventricular arrhythmias. A report of the American College of Cardiology/American Heart Association Task Force and the European Society of Cardiology Committee for Practice Guidelines. Bethesda (MD): American College of Cardiology Foundation; 2003. 62 p. [537 references]

ADAPTATION

Not applicable: The guideline was not adapted from another source.

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2003

GUIDELINE DEVELOPER(S)

American College of Cardiology Foundation - Medical Specialty Society
American Heart Association - Professional Association
European Society of Cardiology - Medical Specialty Society

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

The American College of Cardiology/American Heart Association (ACC/AHA) Task Force on Practice Guidelines and the European Society of Cardiology (ESC) Committee on Practice Guidelines make every effort to avoid any actual or potential conflict of interest that might arise as a result of an industry relationship or from personal biases of the writing panel. Specifically, all members of the writing panel were asked to provide disclosure statements of all such relationships that might be perceived as real or potential conflicts of interest. These statements are reported orally to all members of the writing panel during the first meeting and are updated as changes occur.

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available in Portable Document Format (PDF) from the [American College of Cardiology \(ACC\) Web site](#).

Copies are also available from the [American Heart Association \(AHA\) Web site](#) and from the [European Society of Cardiology Web site](#).

Print copies: Available from ACC, Educational Services, 9111 Old Georgetown Road, Bethesda, MD 20814-1699. Also available from AHA, Public Information 7272 Greenville Avenue, Dallas, TX 75231-4596 (Reprint No. 71-0112).

AVAILABILITY OF COMPANION DOCUMENTS

The following are available:

- ACC/AHA/ESC Guidelines for the management of patients with supraventricular arrhythmias*--Executive summary. A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Develop Guidelines for the Management of Patients With Supraventricular Arrhythmias).

Electronic copies: Available from the American College of Cardiology (ACC) Web site in [Portable Document Format \(PDF\)](#).

Print copies: Available from ACC, Educational Services, 9111 Old Georgetown Road, Bethesda, MD 20814-1699. Also available from AHA, Public Information 7272 Greenville Avenue, Dallas, TX 75231-4596 (Reprint No. 71-0112).

- Management of patients with supraventricular arrhythmias. Pocket guidelines. Order form available in Portable Document Format (PDF) from the [ESC Web site](#). Also available for PDA download from the [ESC Web site](#).

PATIENT RESOURCES

None available

NGC STATUS

This summary was completed by ECRI on March 11, 2004. The information was verified by the guideline developer on May 9, 2005.

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